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International edition

*The independent Dragon magazine*

75p US\$25 November 1984

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Eurohard

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drawing arm

*Sprite graphics board*



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#### How to submit articles

The quality of the material we can publish in Dragon User each month will be very good unless advised on the quality of the documents that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to Dragon User for publication should not be more than 3000 words long. All submissions should be typed. Please allow wide margins and a double space between each line. Paragraphs should wherever possible be computer printed on plain white paper and be accompanied by a type of the program.

We cannot guarantee to return every submitted article or program. So please keep a copy if you want to have your program returned. You must include a stamped addressed envelope.

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## Editorial

MSX HAS BEEN the subject of considerable publicity in recent months. A host of well-known names such as Toshiba, Sanyo and Spectravideo have pledged their support to the MSX standard which allows software written for one machine to run on all other MSX compatible machines. Software companies too have generally been in favour of the new standard, though most of them are still waiting to see how the Japanese actually perform.

In an attempt to gather more support to the MSX banner, the MSX working party organised a recent junket to the south of France to officially launch their range of related literature. This trip was timed to coincide with the first day of the Personal Computer World show, a date which should not have been difficult to avoid.

Those people opposed to MSX cite its 286 386 processor as being old-fashioned and out-of-date, to say nothing of being too expensive. Adherence to the MSX deal was typical about the advantages of software and hardware compatibility. In reality MSX is probably neither as bad nor as wonderful as it is painted. Whether it succeeds or fails will depend as much on the skill with which it is marketed as on its own merits.

The relevance of all this to Dragon is that Eurohard appears to have acquired a licence to produce an MSX machine. Given that Eurohard is now manufacturing Dragons in Spain, this implies that future Dragons may be based upon the MSX standard rather than the familiar 6808 chip. Consequently Dragon's future may be intimately linked with the success or otherwise of MSX.

However, Dragon users can take some comfort from Eurohard's Justin Averis who has pledged that the UK will not be abandoned. Nevertheless, it would seem obvious that Eurohard's first priority must be to build up the Spanish and European markets. The UK, certainly as far as the 32 and 64 are concerned, offers fewer opportunities for immediate expansion.

The question which will concern existing Dragon users is whether or not any future Dragon MSX machines will be compatible with the original 32 and 64. This question is as yet unanswered.



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# Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, Dragon User, 12-13 Little Newport Street, London WC2N 3LD

## Screen dumps wanted

YOUR correspondent Graham Atkinson (Dragon User) most kindly to introduce me to the 1084 graphics card. I have reported no. 1084 graphics for the Dragon over the last two years and it works well with 1084 potentiometers on even 50K at a pinch.

The only possibility I can think of for the problem is that gain information came as linear resistors or as logarithmic resistors. If you have a log potentiometer instead of linear then you have trouble and possibly that is the problem.

On another matter Dragon Data formerly offered free advice (Dragon World Number 3 page 11) information on screen dumps for the Epson and other printers. Could somebody possibly let me have this information. I have an Epson 830 40.

A. Bishop  
244 Astoria Close  
Macclesfield  
Cheshire

## The height of fashion?

WELL IF it is your September edition has it that the Dragon 32 is regarded as slightly old fashioned now? Let's examine it.

Is 32K RAM old-fashioned? Is a good enough most of the time for home computer applications. 32 characters per screen line and reverse video for over case may not be the latest thing but they hardly matter except for word processing and the better WP programs overcome the problem anyway.

I have been able to compare the Dragon 32 in some detail with a direct rival the Amiga which had some very good ideas and is certainly a nice machine with some pluses such as a larger keyboard and run on format integer variables and a RSPAL (RTTL) command. On the other hand it lacks the Dragon's commands RTMLM (parallel in my view) BGETA and STBGET and the extremely useful Dragon feature of accepting BIOS on the LHS of an assignment statement.

The Dragon allows 324 characters per command line giving

one effectively the equivalent of a limited Pascal-style facility of the TRS-80 or F100 while the Amiga only allows 80. The Amiga facility for saving data on tape is quite primitive.

From a brief look at the hand book at a first glance (and much additional) effort, the Amiga even the Dragon I seem to have at the Dragon's plot points emerges that, though it does at times have some plus points of its own. We are told that in the 1084 the Dragon has the most modern processor though like that helps, except for repeatedly large programming is not clear. All is all however the Dragon 32 has some very solid virtues which competitors in the same price bracket do not seem to have fully emulated even today.

Robert Huxford  
London

## Handicapped database

WE ARE in the process of establishing a database of software for the handicapped — HandiSoft Directly. Each entry in the database will contain a description of the programs, the handicaps they are suitable for, the type of computer system required, name and address of supplier/developer and price and so on. This information will be made available through enquiries in answer to specific enquiries.

The aim of HandiSoft will be to facilitate the exchange of information on software relevant to the needs of the lives of handicapped people. Our major objective will be the concerted effort to promote the database and therefore the software stored. This is what we have been doing successfully for non-software products in the field.

## Screen dumps provided

ALL our readers need a listing and sample run of a free program for the Dragon 32 which dumps the contents of the high resolution screen to an Epson FX-80 printer.

I doubt whether a complete listing of screen dump programs can be written in Basic. Joan Graydon  
Cambridge

```
1 RUN DUMP HI-RES SCREEN TO EPSON FX-80 PRINTER
2 RUN BY COMMANDS LISTED
3 RUN SET LINE SPACING TO 1/100 INCH
40 PRINT-2,CHR$(23);"/";CHR$(2)
100 FOR I=0 TO 11
120 PRINT-2,CHR$(22);"/";CHR$(23);CHR$(2)
130 IF I=10 THEN I=0
140 IF I=10 THEN I=0
150 FOR I=0 TO 11
160 PRINT-2,CHR$(22);"/";CHR$(23);CHR$(2)
170 IF I=10 THEN I=0
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# RETURN OF THE RING

THE RING  
OF  
DARKNESS  
PART II

At last the saga  
continues...

The Guardian of Sheldir is defeated, the Hall opened, hordes of the Evil Trolls lie in ruins. Now Ringwraiths, wielders of the Four Bright Rings, must face the greatest challenge: to return the Ring Of Darkness to its creators on the hidden planet Ringworld... And somewhere at the ends of time the forces of evil are preparing their revenge.

After one year of development, Winterson are proud to present the most sophisticated game ever created for the Dragon 32. Written 100% in machine code, RETURN OF THE RING is an astounding multi program island of superb high resolution colour graphics and advanced routines that allow you to communicate with your computer in complete sentences. You will face challenges and excitement as you and your Ringworld companions trell a mysterious planet and brave the dangers of a new and terrifying three-dimensional forest maze. An epic adventure conceived for its wealth of detail and diversity.

May luck travel your path.

Please note: RETURN OF THE RING is a complete adventure. You need not buy THE RING OF DARKNESS to play it.

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01-367 5720

**WINTERSON**  
SOFTWARE

32 UPLANDS PARK ROAD,  
ENFIELD, MIDDLESEX,  
EN2 7PT



ALSO AVAILABLE:-  
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Return of the Ring  
The Ring of Darkness  
Dragon 32

SPECTRUM 48K  
The Ring of Darkness

OSMC-1 48K  
The Ring of Darkness  
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# THE 6809 COLOUR SHOW

## FOR DRAGON AND TANDY USERS

SATURDAY 17TH AND SUNDAY 18TH NOVEMBER

10 A.M. UNTIL 6 P.M.

THE ROYAL HORTICULTURAL HALLS

If you own a Dragon or Tandy colour computer this is your show.

The first ever show organised in the United Kingdom for these machines.

All the very latest hardware, software, interfaces and peripherals will be there. Your chance to get up to date, try and buy all that's new.

We'll also be organising events and competitions with great prizes. The manufacturers will be staffing advice centres to help with all your queries.

Exhibitors will have special offers on their products so you can save money too!

Large gangways and comfortable rest areas will make sure you can see everything and sit in comfort when you want.

This will be a show for the whole family, plenty to see and plenty to do.

If you want to miss the queues just clip the coupon below.

Computer Marketplace (Exhibitors) Ltd. Part of the Rushworth Sales Group, 20 Orange Street, London WC2H 7ED.

### HOW TO GET THERE

The Royal Horticultural Halls are just off Victoria Street a few minutes walk from Victoria or Parliament Square.

Buses 11, 24, 29, 70, 76 and 88 run up Victoria Street.

Mainline stations: Waterloo, Charing Cross and Victoria.

Underground stations: St. James park (District and Circle lines), Victoria (District, Circle and Victoria lines).

There is an NCP car park in Abingdon Street, a few minutes away.

To: Computer Marketplace (Exhibitors) Ltd, 20 Orange Street, London WC2H 7ED

Please rush me \_\_\_\_\_ (qty) adult tickets at £2 each and \_\_\_\_\_ (qty) tickets for under sixteen year olds at £1 each for the 6809 colour show. I enclose cheque for the value of £ \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Telephone \_\_\_\_\_

COMP is the registered name of Horwood Ltd



# 6809 show

OVER seventy-five per cent of the available stand space at the 1988 Colour Show for Dragon and Tandy users on November 17 and 18 had been filled at the time of going to press.

Richard Bergen, project manager of Computer Marketplace, organisers of the event, was confident that the show would be a success judging by the response both from companies that will be showing their products and from the public at large. "We have had an average of £75 per day of ticket sales for the show," said Richard, "which is just less in the same time as we had for the Acorn User show that was organised earlier in the year."

The show, the first ever for the Dragon and Tandy compa-

nies, will be a major opportunity to gauge the amount of commitment left for the Dragon. Most major Dragon software houses have booked stand space and it is believed that Sinclair UK, the Spanish manufacturers of the Dragon may be there.

John Avinger, Exorford's industrial engineer (see profile page 10 this issue) has shown an interest in the event and, according to Richard Bergen, it is hoped that he may do a radio interview on the Young London spot.

Mike Cusack, a former Dragon Data director, has been in touch with Avinger about the possibility of someone from the company appearing on London Broadcasting Corporation's Young London spot.

at 3.15 pm on Sunday 17 November a week before the show starts.

Mike's interest in the show is purely personal, having worked so hard to bring about the success of the Dragon Professional and DS-8.

Neither GEC nor Touchmaster will be attending.

Mordest will be selling its products at a special offer, with at least £1 off everything, according to managing director John Symes. Some items will have up to 75 per cent off, and Mordest will also be introducing its new range of low cost games for the Dragon.

There will also be a free stand for the User group or any group of people who come up with the best application for Dragon software problems or other items of contribution.

Richard Bergen has written to several User groups giving them the chance to come up with an idea, and any group of persons interested in having a stand at the fair and who come up with the best idea for an application for the Dragon are asked to contact Richard at Computer Marketplace, 20 Orange Street, London WC6H 7ED. Telephone 01-630 1812.

Computer Marketplace is also offering readers of Dragon User a 50p discount to enter the show.

Simply cut out the coupon on this page and take it along with you when you go to the show. The coupon is valid for one day only and only one coupon per ticket is allowed.

## Unpaid debts

GAMES and Computers founder John Richardson is facing legal proceedings to recover outstanding debts.

Several companies are believed to be seeking court permission for public examination of his accounts. Monophrase has filed a writ of judgment against him for £5,500 as proprietor of Games and Computers, according to company secretary Richard Davis. A charging order has also been made against his property, although the serving agents have been unable to locate him. Permission is now being sought to serve a writ by post.

Readers who have sent money to the club are unlikely to see either their money or any orders that they may have placed. It is thought that John Richardson has debts totalling £20,000.

Computerhouse UK Limited are not involved in any of the legal action. As at the 30 August John was already dismissed from the company.

Alan Managhan of Computerhouse UK Limited said that John had been speaking as a sole trader under the name of Computerhouse UK since January 1984. He approached Alan and other directors of what is now Computerhouse UK Limited (see Dragon User, September page 8) who initially tried to help people to secure their orders. John was appointed to the board of directors as a trustee to Computerhouse UK Limited taking over the activities of Computerhouse Ltd. However, when Alan realised the extent of John's troubles it was decided not to take over the activities of the club. This leaves John Richardson as a sole trader liable for all outstanding debts. "I'll never see our problems," said Alan Managhan, "John got himself into a terrible hole and was tried to sort out his problems."

Cotswold Computers who are interested in taking over the running of the club are likewise not involved in any of the legal action. David Tomlinson of Cotswold Computers has seen the list of club members, thought to number about 2,000 and is in discussion with persons interested parties about the closure of a magazine.



**THE 6809 COLOUR SHOW**

FOR DRAGON AND TANDY USERS

THE NEW INTERNATIONAL BUILD EXHIBITION 1988 AND COMPUTER EXHIBITION

17th and 18th November

10am until 5pm



**ADMIT ONE**

ADULT/CHILD

UNDER 17 FREE

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## S.O.S.

A DRAGON owner has contacted Computer Marketplace with a problem. He is confined to a wheel-chair but has received two free tickets to the 6809 show for himself and his helper. Although he works, he has no time of transport and is keen to attend his first ever show. Anyone in the Local area who might be able to give Dan Buckley and his helper a lift to and from the show is asked to contact them at 32 Airlie Avenue, Hambleton, Leeds LS6 4JA. Telephone 0532-657634.



# GEC price deal soon

**CUT PRICE** Dragons and peripherals could be on offer soon throughout the major retail stores in Britain.

GEC is negotiating with Boots, Deans, Comet and other high street stores the price of an Dragon Data stock according to a spokesman at the company.

The company also has an agreement with Euronet to sell its Euronet products at a cut price.

Ron Bosanks, former chairman of GEC Radio and Television, who played a major role in GEC's affairs with the Dragon Data Dragon User May 1988) is however no longer involved with proceedings. He

has left GEC to join an electrical equipment manufacturer and has been replaced by Brian Johnston, who has come from GEC McMichael. The



means the GEC has now lost its two top men (John Moore and Ron Bosanks) pictured involved in the Dragon tale over

# New titles on the way

**TACKLE** Real life, machines, gold bar pickers and shoot-down passengers are some of the delights awaiting users of the latest batch of software for the Dragon.

From Romtek Software come the Wizard, a machine code arcade game featuring the characters from the Wizard television advertisement.

The game is available from Westgate at £3.75 including post and package and VAT (Westgate club members can receive a copy for £2.75).

Westgate is also holding a national competition offering 100 Dragon 84's, together with disk drives, colour portable televisions, six games including Wizard, V the Ticker and a glow in the dark poster as prizes. Details of the competition can be found on any Westgate concert poster.

Edley Computer games has four new Dragon 84's. The Bulls is a Huntback type game with 14 scenarios of danger for you to challenge. Panther 94 puts you deep in the crystal mines against the dreaded Gobs and Boms the Gold has the same theme.

Merford Machine is an arcade type adventure which has your search of gold bars.

Edley's games nearest to £1.99 (down from £9.99) except for Merford Machine which costs at £9.99. Further details from the company at Crossways House, Colindale 9th Road, London. All of the

games will be on display at the £500 show.

Interdata has two new releases for November. Customs 4 Down a machine code card adventure and Skunkness an arcade style game. The company has also released three new games recently. Crystal Castle is an arcade game. George is a graphic adventure, and Escape from Mayhem. All games retail for £8, though Microdial is working on a new range of light cost games which it hopes to retail for about £5.

Both Microdial and Edley are negotiating with Euronet in the hope of getting their software included in Euronet's packaging for Dragon. Design-Design, for the City Crystal Computing is putting out Panther's Revenge for the Dragon. Its very low machine code price is a full feature battle with missiles, tanks and so on. The expected retail price is £8.50.

## Complete system

**COMPLETION** is offering Dragon 88 owners £40 credit in part exchange for any of its new deals. Marketing director Ted Coppsall said that the company is making available several packages to provide users with a complete system.

A Dragon 84 single disk drive. Not operating system (Editor's Note: and disk base) will retail for £80. Other packages incorporating hard disk drives and £95.95 and also being offered.

Any used Dragon 88's that the company gets hold of will be donated to Local Education Authorities. However Ted mentions that only a few 88's will be available for donation.

The reduced prices have come about due to GEC making available its stocks that it obtained from Dragon Data.

For full details of the available packages and prices contact Coppsall at 2900 Green Lane, Palmers Green, London N12.



The BT2000 modem manufactured by Mircia Technology is a GART (British Approach Award for Telecommunications) multi speed modem which can be used with telecommunication systems on Cyclic Time Release. The modem, which is compatible with a number of computers including the Dragon 84, has a speed range of 75, 300, 600 and 1200. Unfortunately the company has no plans to write any software for the Dragon 84. Dragon owners would have to write their own. Further details about the modem (price approx £195) are available from Mircia Technology, 13-17 St Peter's Street, Ipswich IP1 1BX, telephone 0473-622442.

## Software cuts

**TOUCHMASTER** has dropped the price of its software for the Dragon 8400 games now retail for £3.99. Its following (also with educational content) has cost £5.49.

A complete list of the latest Dragon software prices and a retail order form can be obtained from Touchmaster at PO Box 47, Post Telford SA12 1SD.



"Tony Rich is the only one who can tell how much he (Howard) has to depend on him for his investment programme!"



# The Spanish connection



A THIRD LEASE of life is being given to the Dragon country of Eurohard SA — the Spanish-based microcomputer manufacturer backed by a combination of public and private funds. Eurohard is in business to "give continuity to the Dragon site and impose its overall strategy," according to Benito Justo Alvarez. Eurohard is a top man in the UK.

Gerard Alvarez is Eurohard's director for Industrial Engineering. He has been in Britain for over a month-and-a-half organising and overseeing the transfer of machinery and products from Dragon Data's plant in Port Talbot to Eurohard's factory in Gacera, Spain. His aim is to begin immediate manufacture of the Dragon 32 and 64 in Spain for world-wide distribution. In the short term Eurohard will produce the Dragon to the exact same specifications as Dragon Data's 32 and 64. However, within six months, there could be some interesting developments.

Justo, who spent 10 years working for the national Spanish railway company prior to joining Eurohard, is hoping to specialise in the development of new products once he has managed to get the manufacture of the 32 and 64 on the way and has overcome any initial teething problems. With Spanish railways he was responsible for development planning and was especially concerned with data processing. The Spanish railway company he said was the first in Europe to have electronic ticket sales developed in conjunction with the giant German electronics company Siemens.

## MSX — top of list

The project that comes top of his list in Eurohard's development plans is the manufacture of a Dragon MSX machine. Eurohard has obtained an MSX licence from Microsoft for an undisclosed sum and plans to begin production of the machine at the beginning of next year. The company is also studying the feasibility of using a second chip to make the machine compatible with Dragon software. Justo confirmed that it was Eurohard and not GEC that had obtained the licence to

manufacture the Dragon MSX machine.

So important is priority to MSX that Eurohard is striving for the time being plans to manufacture the Dragon Professional 40 (pdp4) Alpha, as Justo referred to it. Alpha is not as important, we are more concerned with MSX and pdp4th as it.

Eurohard has huge financial backing. Public sector finance comes from two Spanish development agencies — Sorex and its Service is a local development agency with just under a 40 per cent stake in Eurohard. The national development agency has a less than 10 per cent stake but owns half of Sorex and is reportedly the largest business consortium in Spain. It has diverse interests in mineral and is especially concerned with new technology hence the stake in Eurohard.

Together, the two development agencies own just under half of Eurohard. The major backer of the company is a large financial group headed by Spanish. Its chief chairman, Eduardo Mingos, though not said itself has no connection with Eurohard.

Formed earlier this year Eurohard's headquarters is based in Madrid. The

connections capital in Spain. Eurohard's Madrid offices will be responsible for public relations and marketing while the manufacture of the computers will take place in the Spanish regional development area, Gacera, near Portugal.

Justo claims that the Dragon is the third biggest selling micro in Europe, coming behind the Spectraview and Commodore machines and is Spain's best-selling ahead of the Alan and Geo. He intends to maintain and hopefully improve its position, particularly in countries where there are no entrenched computer firms.

## Obvious advantages

There are obvious advantages in Eurohard's attack on the Spanish market and it is evident that the company expects to capture the lead from Sinclair. To back this up, a Spanish television programme is planned with Eurohard being a central role in that undertaken by Acorn for the 6400 computer to show in Britain.

Justo stresses, however, that Eurohard is not solely concerned with the Spanish market. The company is concentrating on a worldwide sale taking including Britain. In the UK, distribution will be by GEC with technical support by Tricomputer.

When asked if he thought that many more Dragons would be sold in Britain he replied that GEC is a large company and large companies are not used to thinking in the short term — "take this as a sign that we Dragon will improve its position in the UK." Justo went on to say that Eurohard is getting in touch with software companies in Britain, and indeed, with all the people we know who have connections with the Dragon.

"We are open to help and suggestions that could be beneficial for the Dragon, especially concerning software and peripherals — we can't distribute and sell them by ourselves. I hope this is the beginning of a new Dragon era," said Justo. "We don't want Dragon owners to feel abandoned — they are not abandoned."

— Gordon Ross



Benito Alvarez of Eurohard



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## Hatch

**Program:** Chicken Run. Info: 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

FARMER Polly runs a chicken farm — rather a small chicken farm, as there is only one chicken in it. You have to guide the chicken to the nest-doles where she will auto-lay and lay an egg, and to the feed trays to replenish her energy with corn. You also have to guide Farmer Polly to collect the eggs before they hatch into hungry chicks and spoil the feed bags.

There is a lovely set of icons — a fox appears at intervals through holes in the wire fence on eating the chicken or one of the newly-hatched chicks. Having a stock alarm is quite a good thing as the fox never takes delight in the corn supply. If the fox eats your chicken, however, one of your three birds is lost.

The game is controlled by joystick only. The joystick lever controls the direction in which the chicken moves, and

the fire button controls the farmer. This technique of controlling two moving objects with the same joystick doesn't seem to be terribly effective. I found it impossible to persuade the farmer to do anything except run straight up and down a ladder unless the fire button was held down continuously, when the farmer's movements were no less random but more powerful.



The graphics are good, though I would have liked to have more than one screen. The sound effects are fairly impressive but soon become irritatingly repetitive.

On the whole this is an interesting game, but not I think, one with lasting appeal.



sound effects too, as is the limited, consisting mostly of 'bang' and 'squelch' noises. The overall effect, however, is good and compared to some

of the games currently on the market, Carber scores well.

David Rowntree



## Stakes

**Program:** Cool Plays 31. Info: 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

SNAP Software is a new name to Dragon Owners. Its first release, the old card games namely Carber and Portman — the latter is a licensed title.

Cool Plays 31 is a faithful reproduction of the game of Portman with a few added extras. The program, which is written in Basic, suffers on loading and after several title screens (some in high resolution graphics) gives brief instructions on how to play.

causes a different Texas display to be shown. The game is very simple to operate, simply enter your stake and press '1' to bet or '5' to skip.

Unfortunately there seems to be a few bugs in the program. An ace can count as one or eleven in poker, but Cool always uses it as a seven which means the sometimes 'busts' below 21.

Another more serious oversight is that the cards always appear in exactly the same order after loading the game. This is because the random routine used resets the random number seeds that the program uses, and the program doesn't bother to



The graphics involved in the game range from good to disappointing — all the cards are displayed using low resolution, dithered graphics and text, however I have to be a real picture of Cool P. Dragon — your opponent in the card game. Cool appears after each game either grinning or frowning depending on whether he has won or lost.

Admiring the magic 31

randomness from at the start of each game. Obviously, after a while you get to know the pattern of cards which defeats the object of the game.

At £4.95 this piece of software is one of the cheapest around, but can I expect to get anything resembling for this price.

Brian Dodge



## Burble

**Program:** Carber. Info: 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513



though, but these proved unfounded.



Not only is this a conspicuously unoriginal game, it isn't even a good one. There are some major bugs in it which cause you to die helplessly with great speed. I tried playing it with both keyboard and a joystick at several different levels of difficulty,

but with the same result every time — I died one or two little while later, then I apparently got hit by a succession of invisible bombs and the game ended.

What I saw of the game before disappearing in a puff of smoke made it depressingly clear that even without the bugs the tape would really not be a useful addition to anyone's collection. The graphics are unimpressive, the sound effects dull, and the action slow. The directions provided by the instructions in later phases of the game didn't stand up to the unremitting effort.

Surely, Lynwood, but this really isn't up to the standards of commercial software nowadays. Back to the drawing board with this one!

Margaret Newman



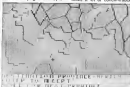
## Legions

**Program:** The Fall of Rome  
**Args:** Prime Software, 1 Garden Lane, Queens, London W16 8JL  
**MSL Price:** £12.00

THIS IS an adventure-type game written in Basic and also available for a number of other machines. The general idea is that you are in charge of the Roman Empire, with control over armies, income, expenditure and so on at all parts of your Empire. On the screen you have a coloured map of Europe (as we call it today) with the countries (so they were then) marked on it. What we try to do is to build a

divine tribal group from the north coast a lot of battles and so if this was not enough you also have to find time and resources to do battle with armies from the two Empires of the East.

The game progresses through three phases: The Invasion and Expansion phase, the Movement phase and the Combat phase. I found that it took a great deal of practice to be able to understand and play this game properly and even stand a chance of securing a victory. Playing a game does take up a lot of time, but if you are "into" the type of game then it is quite good and takes a lot of concentration.



During each stage a marker indicates which country you are dealing with at any one time, rising above, converting other legions to make legions and so on.

While you are busy trying to put your legions in order

The display is also quite good, though I feel the game is not for the younger members of a family.

Add up Lynwood



## STAR GAME

## Quest

The Guardian or Shodin is defeated. The Lord of the Evil Sage is at Bay. Now Ring-Larsen, the Lord of the Four Bright Kings, must face the greatest challenge to return the Ring of Darkness to its creators on the hidden planet Ringworld.

**Program:** Ring of Darkness  
**Version:** 2.0  
**Light:** Red  
**How:** Enter, Windows, and  
**RTT Price:** £12.00

WHEN Windows originally released The Ring of Darkness I was surely one of the best adventure games available for the Dragon. The game enjoyed such success that it was inevitable that a sequel would follow.

Return of the Ring is subtitled "The Ring of Darkness Part 2" and is a piece of software it is far superior to its predecessor. The program is written in 100% machine code with full colour high resolution graphics (768000) is fixed with text which includes level

A bonus picture showing just how far the game has come, below this is a text window where command lines are entered. One of the best features of this game is its ability to handle whole sentences such as "Give the dagger to Mark the Elf" and so on.

The quest begins in a room which is displayed from above, figure movement is achieved via the arrow keys. In this part of the adventure you can fight and interact with monsters and enter villages to buy and sell useful items. These villages are also displayed and entering a village shows a 3D picture of the inside of the room to be de-



As with the Ring of Darkness, side A of the tape allows you to set up your role play character — you are given points to divide up amongst number of fees and various characteristic attributes, and you must also decide what form your character will take for example "Human Warrior" or "Elf Technician". This procedure need only be done once as you can save the game and your character on tape at any point.

The game itself is on side two of the tape. Clear instructions are given in it when to start the adventure — the game is too large for 126k so parts are loaded in and out as required.

Other resources such as the level planet are loaded in from tape and are shown in excellent 3D graphics. A few characters that you meet are controlled by a program called Actel and are capable of doing most things you can do of their own free will and may join you in help in your quest.

There is simply not room to describe all of this game's features — the program took over a year to create. It is certainly the best adventure role play game that I have seen for the Dragon so far and is excellent value at £12.00.

Hein Castle





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FROM  
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## King Tut

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**NEW  
FROM  
MICRODEAL**

**DRAGON 32**

## CRASH

Send our hero from THE KING! (a.k.a. Crash) back to his home land from the tropical wastes of the Amazon. He's been trying to get back to his plane. He must collect the elusive parrots, bouncing birds, jumping frogs, some rather smart monkeys and finally hope that bird doesn't get him when he panics! 100% machine code, high resolution graphics, super sound (cd 4 speakers). For 1 or 2 players. Joystick required.



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## THE KING

A legend in its own time, simply the best software to have been written for the Dragon and Tandy color computers. With its full colour, high resolution graphics, sound (cd 100% machine code, superb sound) this is the ultimate test of a joystick. For 1 or 2 players.

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# Playing with sprites a la mode

Brian Cudge reviews Premier's sprite graphics board

FOR THOSE Dragon owners who turn green when they see graphics produced by Atari and Commodore machines, help is close at hand. Premier Microsystems has just released a sprite graphics board for the Dragon 32.

The board itself is connected via a ribbon cable to the Dragon's cartridge port and takes all its power from the host computer. After initial power up, the user simply types C60C 44-6000 and takes the tv lead from the Dragon's socket 1 and plugs it in the one provided on the graphics board.

All the electronics are housed in a two-tone plastic case measuring about 4 x 8 inches, and it can be purchased either ready-assembled (or as a kit). The circuitry is quite complex and very tightly packed so you need a fair amount of experience before attempting any self-assembly. Instructions and a wiring diagram are given in the manual, but these could hardly be described as being written for the beginner, and there are no hints on fault finding.

## Four modes of operation

The new display is produced by a Teknix Instruments TM8100A VDU chip. This offers four modes of operation with 32 sprite levels and 16 colours.

Sprites are simply moveable graphics objects which have their own priority level — that is, the sprites with a lower priority will pass behind those with a higher priority. Sprites are totally non-destructive and don't need to be "rotated off" when they are moved. As each plane can contain only one sprite this means 32 individual sprites can be displayed at any time, although the lowest priority is the same as the background colour and will not often be used.

The four separate display modes offer the following:

Mode	Resolution	Colours
1 Text	40 x 24	text only 2 of 16
2 Text	32 x 24	sprites 16
3 Graphics	64 x 48	16
4 Hi-Res	256 x 192	sprites 16

(2 in a group of 8 pixels horizontally)  
4 Graphics: 64 x 48; sprites: 16

On power up, mode 1 is automatically selected with white text on a dark blue background. The display quality is very high — much improved on the Dragon's own hi display. Mode 1 is usually used for programming as this can display the most characters at once, but cannot have sprites. The display is noticeably slower than the Dragon's own, especially when scrolling.

Probably the most useful mode for

games is Mode 2. Although the resolution is a chunky 64 x 48, you do get the advantage of mixing text with graphics. In addition, all game characters are likely to be sprites which have the same resolution in any mode. Two sets of sprite shapes are available and all of these are reddefinable. The first set is the vector character set, and can be used only in mode 2. The other set contains 32 shapes and can be used in any sprite mode.

Sprites can be displayed as either normal or double size in all modes. However, all sprites have to be the same size.

The graphics board also contains an option to interface the new character sets available with kilobaud. The technique used is to interrupt the downward handler of the Dragon and send it certain commands such as Pset and GUS. The computer is then re-directed to give these new meanings. I prefer the method of adding commands as this prevents the programmer from having to use rather meaningless commands like RESET to define a sprite shape. Most of the new meanings are more obvious, FMODE is used to select the mode, although the graphics page number is no longer required as the board has its own 16K of video memory.

This extra memory also has the advantage of freeing most of the Dragon's memory that is usually reserved for its own display — user data is returned to the user. It is not possible to switch between the Dragon's display and the board's display without switching off first. Also the Dragon's screen is not produced through the TV socket when using the sprite board.

Commands to set points, draw lines and circles are included, but most

be used as normal on the now expanded screen. Put and Get are not included as these are obviously not needed with the introduction of sprites. Putf is used to position a sprite on the screen — the x and y coordinates are given, together with the colour, shape size and level of priority.

In addition to the sprites, all the characters are reddefinable using the "PRDEF" command, so it is possible to get pseudo letter graphics even in the text modes.

Although the display potential of the board is greater than anything a Dragon could normally produce, the implementation of the Basic board's something to be desired. As already mentioned, the "new" commands are rather limited compared to the Dragon's own. In addition, one of the most important parts of sprite graphics is missing completely — that is collision detection.

The games programmer will have to make do with comparing coordinates with all the problems that entails. There is also no facility for setting sprites moving on their own in a given direction, each one has to be individually moved. With 32 odd on the screen this can seriously affect the speed of a Basic game.

The manual which Premier supplies with the board also contains details of machine code entry points to their ROM for anyone wanting to write arcade speed games using the board. The manual describes each command in detail, but there is only one example program given at the end and this doesn't even use sprites! Although the general documentation is good, it is not up to Premier's usual high standard. Many more example programs are needed.

## Comes the crunch

The crunch comes when you see the prices — £695 is a lot of about £127 ready-made. That they seem a lot less is not unreasonable considering the components involved. Unfortunately to Premier, I think many users will plump for cheaper software alternatives like "Sprite Magic" from Knight Software at £17. Although you don't get the advantages of 16 colours, an improved display and hardware sprites, you do get the same upper/lower case software sprites and a much more than such extension to Basic.

The final decision as to whether you really need this board is yours of course, but be warned: the board will only connect with 516 machines. Don't be short-sighted. Taken by Premier in its design, the board will not seem with upgraded Dragon's or Dragon 64's. However, Premier say they can alter boards for 644 machines, if required. ■



Peter Bates of Premier



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```

400 IF (X=0, Y) THEN GOTO 100, ELSE GOTO 420
410 GOTO 100
420 GOTO 100
430 GOTO 100
440 GOTO 100
450 GOTO 100
460 GOTO 100
470 GOTO 100
480 GOTO 100
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1021 GOTO 100
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1198 GOTO 100
1199 GOTO 100
1200 GOTO 100

```



## Turtle comes out of its shell

John Byrne presents a turtle graphics program written in Elixir.

TURTLE GRAPHICS is based on the "turtle" which can be told to move forward or backward, left or right and various other things. The original "turtle" was a mechanical robot that counted, added and subtracted that was linked by a cable to a computer. By typing commands on the computer, the turtle could be moved around the floor (which really needed to be covered with paper). It had a pen which could be up (not touching the floor) or down (touching the floor) so that as the turtle moved it could draw a line on the floor that showed the path it had followed. Similar turtles are still available.

A later idea was the "screen turtle" which moves around on a television screen instead of on the floor. The program provides turtle graphics based on a "screen turtle" by giving Forti definitions of the words a Turtle should understand.

The People's Defenders who are sentenced 4 to 10 of the 10 years. They have been helped and should be sent to other places, not

Dragon Data Forth (However the Dragon Data Forth I used had an error that prevented test being entered to the Forth address — this error is fixed by HDK SE4C-4F0C 1). The definitions should also work on other versions of Forth if words that manipulate data (like lines and save screen, above, are defined).

You need to know two things about the turtle: where it is and which direction it is facing. You can tell where it is because it is drawn on the screen (as a right-angled triangle). The gap (which closes on the screen if it is down) is at the right-angled corner of the triangle. The arrowhead shape of the turtle is designed to point in the direction which the turtle is facing, which is the direction it will travel when called to go forward.

To move in other directions, the bottle must first be turned to face the required direction, and then ordered forward. Here is proof that the system is adjusting the flow, and you are in control of the bottle and

**Look from above** This means that if, for instance, you order the turbine to turn right 45 degrees, it will turn 45 degrees clockwise.

Once screens 4 to 16 are loaded, you can tell it what to do using the following words:

## 11. Discussion (continued) - Methods

The word *switches* is the display from the last screen (which you type words) to the previous screen (which is the flag that the turtle moves around on). This word should be used before a sequence of commands to the turtle, if you want to see the commands being executed.

**Example 1** 18/10 00 RT 18/10  
Note: Flight details are not recorded until you press the Enter key so all the highlighted input of course is finished by pressing Enter

```

000: 0 4
01: < ### TURTLE GRAPHICS ### >
02:
03: < COPYRIGHT J P B. 1990 >
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```

[illegible]

```

SUBROUTINE SUBROUTINE
  1  DIMENSION A(10), B(10), C(10), D(10)
  2  DO 10 I=1,10
  3    C(I)=A(I)+B(I)
  4    D(I)=C(I)*2
  5  END DO
  6  RETURN
  7  END

```

```

1000 0
1001 0
1002 0
1003 0
1004 0
1005 0
1006 0
1007 0
1008 0
1009 0
1010 0
1011 0
1012 0
1013 0
1014 0
1015 0
1016 0
1017 0
1018 0
1019 0
1020 0
1021 0
1022 0
1023 0
1024 0
1025 0
1026 0
1027 0
1028 0
1029 0
1030 0
1031 0
1032 0
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1038 0
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[illegible][illegible]

```

00000000: 7 00 73 .
00000004: 04 04 8000 1000
00000008: LDR
0000000C: 0 0D 02 - @ 000 8000 LEAF
00000010: 0000 0 0 0 000 0 0 0 000
00000014: 0000 0000 LDR 0000 000
00000018: 0000 0000 LDR 0000 000

```

[illegible]

```

SUBROUTINE
  1  VERIFOLD FORM
  2  COMPLY FTRL, 0 17 1016 0000
  3  FORMS 0 17 0000 00 0000
  4  LINE 0 0000 0000 0000
  5  FTRL, 0 17 1016 0000
  6  PO 0000 0 0000 0000
  7  ==0
  8

```

```

1000  * LT
1010  * BT FIRST & IF WIFE END-OF
1020  * WHILE & - IMPROVE PABLE
1030  * FIRST & BT TURTLE END-OF
1040  * LT FIRST PD
1050  * BT FIRST PD
1060  * & CONSTRUCT INDEX & CONSTRUCT RIG
1070  * & CONSTRUCT YEL LOW
1080  * & CONSTRUCT YEL LOW

```

```

TOP = 1.4
@ PRINT FORTL @ IF WOLF ENDF
@ UN FORTL @ WOLF ON
@ PRINT FORTL @ IF TURTLE ENDF
@ CLS @ FORTL @ WOLF @
+ FORTL @ @ FORTL @ WOLF
@ FORTL @ IF TURTLE ENDF
@ ---@
@

```

```

SCR. 0 13
0  RICH FTRL 0 IF RICH
1 0 FTRL 1 RICH
2 0 RICH FTRL 0 IF RICH
3 1 FTRL 1 RICH
4 0 FTRL 1 RICH
5 0 RICH 0 FTRL 1
6 0 FTRL 1 RICH
7 0 FTRL 1 RICH
8 0 FTRL 1 RICH
9 0 FTRL 1 RICH

```



**7** This word switches the display from the graphics screen (where the turtle is) back to the text screen so that you can see what you're typing. *Example: 7*

**MOVE** Moves the turtle (makes it move) to the point (x,y) without the picture that it has drawn. Also, although the turtle is not moving, it moves even faster when it's invisible. *Example: 1 MOVE*

**SHOW** Shows the turtle (makes it visible again) so that you can watch what it's doing. *Example: 1 SHOW*

## 2) Movement Words.

**FD** Tells the turtle to go forward a given number of steps. *Example: 7 40 FD* moves the turtle forward 40 steps.

**BD** Tells the turtle to go back a given number of steps. *Example: 1 70 BD* moves the turtle back 70 steps. The screen itself is 250 steps x 150 steps.

## 3) Turning Words.

**RT** Tells the turtle to turn to its right an "amount" by a given number of degrees. *Example: 1 90 RT* turns the turtle 90 degrees to its right.

**LT** Tells the turtle to turn to its left an "amount" by a given number of degrees. *Example: 1 90 LT* turns the turtle 90 degrees to its left. *Note: Just as you can make the turtle move using the text*

*and the letters only of FORWARD, BACK, RIGHT, and LEFT.*

## 4) Drawing Words.

**PERFORM** Tells the pen down on the turtle screen in 2 minutes.

**PENUP** picks the pen up so the turtle doesn't draw as it moves.

**PEN** Just used to say what color pen and paper are to be used.

**PAUSE** Just used to specify the color of the pen or paper. Only the first four letters are used.

**SET** In the last four of them, colors can be used together. (The first four are invisible what you use the word 1 to switch the display to the graphics screen. The last four are invisible when 1 is used.)

**CLS** Clears the screen (puts a clean sheet of paper on the floor).

*Example: 1 GREEN,PEN,UP,OR,PAUSE,CLS* makes the turtle draw a green pen on blue paper.

*Note: The display must be correct to allow color to go good. The words can go set for color by using all PERFORM, or higher resolution in green and black or just and black only. Type all PERFORM. The pen color can be changed at any time and will have an immediate effect. The paper color can also be changed at any time. Nothing will happen until you start a new sheet of paper using the command CLS.*

**PICT** Prints in a shape. Printing starts at the top of the turtle's head (the point of the arrowhead) and spreads out until it reaches a line the same color as the point. The picture is the same as the pen color, so if you draw a shape in

RED,PEN, then PICT is a shell (as pictured). If you're using a new shape then PICT will not do anything.

The turtle remembers numbers, but it executes a word as soon as it comes to it. Therefore, you must first give a number, saying how much you want the turtle to move or turn, and then give the word to move or turn. If you do not give a number before the commanding word, the turtle will draw a line — which probably won't be the one you wanted. So take care to put the number first, eg. 10 FD not FD 10.

The turtle recognizes words in collections of characters separated by spaces. Two words not separated by spaces will be treated as one, and the message ERROR will be given.

The turtle will get upset if told to move outside the limits of the screen (for instance by 1 1000 FD). If it is still learning to you, the turtle can be brought back to the center of the screen and the screen cleared using CLS.

The best way to get the turtle to draw what you want is to build up the picture (or pattern) piece by piece. This can be done by teaching the turtle words which draw simple shapes. These can then be used to teach it words which draw more complicated shapes, and so on until eventually you have a word which draws the whole picture (The word which draws a bunch of flowers [screen 42] shows this nicely).

## 5) Teaching words:

The word pronounced "look" tells the turtle that you are going to teach it a new word, followed by the old word that you want the turtle to carry out when you say the new word.

This word (pronounced "teach") tells the turtle that you've finished the explanation of the new word.

Suppose you want to teach the turtle a new word to make it draw a triangle. If you type in 30 FD 100 RT 30 FD 100 RT 30 FD and finish by pressing the enter key, the turtle will draw a triangle (the word 1 will show it to you). You can teach the turtle a new word, named "triangle", which draws a triangle like this: **TRIANGLE** 30 FD 100 RT 30 FD 100 RT 30 FD.

The turtle will remember the new word "triangle", and will draw a triangle whenever you use it (To use this, type 1 TRIANGLE and press the enter key). You can use any collection of characters you like as the name of a new word, but it makes things easier if you use names that describe the shapes the words draw. You could have typed: **TRIETH** 30 FD 100 RT 30 FD 100 RT 30 FD, so that, if **TRIETH** made the turtle draw a triangle, but this would not be so easy to remember.

You can now draw a more complicated picture using the word "triangle" in the explanation of another new word. For instance **STRANGE** TRIANGLE TRIANGLE TRIANGLE TRIANGLE, explains a new word named STRANGE which draws quite a pleasing shape.

Screens 17 to 23 give a demonstration of what you can draw with the turtle. ■

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1 8 FORWARD 50
2 30 COLOR PINK,PEN,UP
3 5 FORWARD 100
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1 8 FORWARD 50
2 30 COLOR PINK,PEN,UP
3 5 FORWARD 100
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SCR # 16
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2 30 COLOR PINK,PEN,UP
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SCR # 18
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SCR # 19
1 8 FORWARD 50
2 30 COLOR PINK,PEN,UP
3 5 FORWARD 100
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1 8 FORWARD 50
2 30 COLOR PINK,PEN,UP
3 5 FORWARD 100
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1 8 FORWARD 50
2 30 COLOR PINK,PEN,UP
3 5 FORWARD 100
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Joystick  
required

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# Build your own drawing arm

Peter Whittaker explains how to build a drawing arm

HERE IS another project for fellow Dragon owners with ham-fisted soldering skills. I have long regretted with jealousy the digitising units or drawing arms available for the Spectrum and BBC micros. I eventually set out to see what I could accomplish with my trusty Dragon.

The 8 bit A/D converter used by the Dragon joystick splits the reading from a 1024 potentiometer into 64 steps (3-63). If the standard 1024 pots with 270 degrees of turn are used there is an angular resolution of about 4.5 degrees per step (270/64). With a drawing arm of 10 inches in length pictures could be copied at blocks of a half-inch-square resolution. This is obviously completely useless. The problem is resolved by using 1024 pots with only 36 degrees of rotation. This gives an angular resolution of 0.5 degrees per step and with a 10 inch arm a copying resolution of 0.1 (1/10) inch square. This is good enough to be worth doing.

The 36-degree pot does not allow much movement so the positioning of the two arms has to be redesigned. Placing them at right angles (figure 1) gives 36 degrees of movement in both axes. This area covered will not be a perfect square, but a rhombus. This is because the angle of the second arm to the vertical will vary according to the angle of the first arm (figure 2). However, accurate copying will be achieved within this rhomboid area.

If we take the shoulder as our origin (0,0) the position of the forelimb (A, B) can be easily calculated:  
 $A = L \cdot \cos(\theta_A)$   
 $B = L \cdot \sin(\theta_A)$

If the first arm is not horizontal the second arm will not be vertical when it is at right angles to the first arm. The angle of

the first arm (A1) needs to be subtracted from the angle of the second (A2) to find an angle in the vertical (figure 3). The position of the 'Pinger' (C,D) can now be calculated:

$$C = A + L \cdot \sin(A2 - A1)$$

$$D = B + L \cdot \cos(A2 - A1)$$

If the arms are 10 inches long then will



Fig 1 Basic arm design

be a range of finger positions from 7 inches to 13 inches along each axis. If this is multiplied by 10 then the equivalent point on the frame screen can be pasted (fig 1).

Using 2 squares up the size of the copy and draw a line from the last point (a) to the next. By pressing the fire button, the program switches between drawing a line and moving a dot across the screen. Pressing any of the keys 3-8 will set the colour of the line. Pressing the 0 key will dump the screen to a Tektronix printer.

To construct the electrical wiring of the drawing arm, the wiring diagram used is exactly the same as that for a joystick (figure 4). Take the joystick unit and with a small screwdriver or penknife bend back the clips which hold the potentiometers in



Fig 3 Angle of second arm to vertical

place (figure 5). The assembly will fall apart once the pots have been removed.

Take the four long pieces of wire and solder one to each of the pins #1, 3, 4 and 5 of the DIN plug. Solder the sixth long wire to the centre leg of pot #1. Wire #2 to the centre leg of pot #2 and wire #3 to one leg of the fire button. Use a 10 inch wire to connect the left leg of pot #1 to the left leg of pot #2.

A second 10 inch wire connects this left leg of pot #2 to the spare leg of the fire button, which is then further connected to wire #4 from the DIN plug. Connect wire #5 to the right leg of pot #1 and a 10 inch wire to further connect this leg to the right



Fig 5 Joystick unit

leg of pot #2. Insulate all connections with tape, and check for short circuits.

To construct the drawing arm, then, wires, obtain two pieces of strip metal (wood cardstock or whatever) about 10.5 inches long, and drill a hole at one end of each just big enough to fit over the lug on the potentiometer. Drill a second larger hole at the other end of the left arm (a) 1/8 inch around the back of the lug on the underside of the pot without rubbing.)

Plug the DIN plug into the right joystick



Fig 2 Arms covered by drawing area



Fig 4 Circuit diagram for drawing arm



of type in listing 3 and ROM 4: Set pot to a value of 31 and then give an arm pot to the top of each pot. Check to make sure that you can turn it sufficiently to get the full 0-60 range of readings; then give the back of pot #2 to the end of arm #1 (with the hole in it) making sure that pot #2 can still turn.

Put #1 on either be permanently fixed to a drawing board, or temporarily stuck to the table with blu-tack. If blu-tack is used

then be careful that moving the arm turns only the potting and not the whole pot assembly in its blu-tack base.

That should be the drawing arm complete. Minor adjustments may have to be made to the program. The range of  $(x-y)/2$  for this angle may need slight adjustment depending upon the accuracy of the pots used. The actual length of arm used (not 10 inches each) also needs to be taken into account. The programs will run much

better if your Dragon can take the speed-up pots (POT055-405-0). ■

#### Parts list

- 4 potentiometers 2 inches long
- 1 potentiometer 12 inches long
- 1 of 250 degrees 5 pin Dcm plug
- 1 push button switch
- Tandy 275-1047 £1.99 for each of 3
- 1 Tandy physical performance test 275-1765 at £2.99

```
10 PMODE4:1 PCLS:SCREEN1,1
20 L=10
30 R1=JOYSTX(0) R2=JOYSTX(1)
40 R1=(R1-31)*2/(100-31)+1415926 R2=(R2-31)*2/(100-31)+1415926
50 X=L*PI*COS(R1)+SIN(R2-R1)*Y=L*Y*SIN(R1)+COS(R2-R1)*Y
60 X=INT(X/100)*10+R1/5 Y=INT(Y/100)*10+R2/5
70 PSET(X,Y):1 GOTO30
```

Listing 1

```
10 L=10 R=2:PMODE3:1 PCLS:SCREEN1,1
20 R1=JOYSTX(0) R2=JOYSTX(1)
30 R1=(R1-31)*2/(100-31)+1415926 R2=(R2-31)*2/(100-31)+1415926
40 X=L*PI*COS(R1)+SIN(R2-R1)*Y=L*Y*SIN(R1)+COS(R2-R1)*Y
50 X=INT(X/200)*4+340.5 Y=INT(Y/200)*4+340.5
60 RM=INKEY$ IF RM="" THEN 30
70 IF RM="/" THEN R=R+1 IF RM="." THEN COLOR VAL R: GOTO100
80 IF RM="E" THEN 140
90 IF PEEK(65536)=128 OR PEEK(65536)=224 THEN SOUND100:1 IF R=1 THEN R=2 ELSE R=1
100 ON R GOTO 110,120
110 LINE=X,Y:3:PSET GOTO20
120 P=POINT(X,Y) FOR B=1 TO 8:PSET(X,Y,B):NEXT P:CT(X,Y,P)
130 GOTO "BM"+STR$(X)+","++STR$(Y) GOTO20
140 ELSE:PRINT"CHECK PRINTER IS ON AND <ENTER>":GOTO41194
150 PMODE4:1 SCREEN1,0
160 PRINT#2,CHR$(13);CHR$(8):CHR$(13)
170 FOR A=0 TO 255 STEP7
180 FOR B=191 TO 0 STEP -1
190 C=128+POINT(A,B)+POINT(A,B)+2+POINT(A+1,B)+4+POINT(A+1,B)
200 PRINT#2,B:CHR$(C):CHR$(C)
210 NEXT B:PRINT#2,CHR$(13)
220 FORB=191 TO 0 STEP -1
230 C=128+POINT(A+3,B)+POINT(A+4,B)+2+POINT(A+4,B)
240 PRINT#2,B:CHR$(C):CHR$(C)
250 NEXT B:PRINT#2,CHR$(13)
260 NEXT A:PRINT#2,CHR$(13)
```

Listing 2

```
10 CLS
20 PRINT632,"POTENTIOMETER CALIBRATION:"
30 PRINT636,"POTENTIOMETER #1":JOYSTX(0)
40 PRINT6160,"POTENTIOMETER #2":JOYSTX(1)
50 IF INKEY$="" THEN 20 ELSE END
```

Listing 3





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THE CLARE started life as a simple exercise in the use of the Backus-Naur Form (BNF) and PLOT.

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Custom Basic doesn't allow creating a

be used with GEM GET PUT GOTO or GOSUB commands, so each array has to be named separately. A short introduction game has been included but don't be fooled. On loading the screen is filled by the graphics of a car. Parts of the car are moved about the screen and the idea of the game is to follow each block of car to its rightful position.

```

46 A R, S=82
47 DEF OR, S=82
48 S=S-1
49 IN 11R, S
50 PRINT:PRINT"WOULD YOU LIKE A SA
PLE GAME Y/N":SOUND 120,1
51 SA=IN C15:IF SA="" THEN 53
52 IF SA="Y" THEN SA="1":GOTO 41
53 PRINT$C90,"GIVE ADVICE TO ALL
LEVEL 1-4"
54 SA=70
55 SOUND 120,2
56 OR=IN C15:IF OR="" THEN$A ELSE $
=IN C15
57 IF $=4 OR $=1 THEN $=4
58 CLR:PRINT$,"SELECT A DRAWING
$ ":
59 PRINT$C90,"1. CIRCLE$":PRINT$C
2,"2. CAR $":SOUND 120,2
60 SA=IN C15:IF SA="" THEN$A
61 IF SA="1" THEN T=1 ELSE $=2
62 CLR:PRINT$C3,"A SIMPLE PICTU
RE WILL BE DISPLAYED AND THEN SH
OWED COPY TO RESTORE. USE THE
ARROW KEYS TO MOVE THE YELLOW @
LOOK."
63 NOW FOR A SIMPLE DRAWING:
64 PMODE$,"1,POL$
65 IF 1<1 THEN$A
66 CIRCLE(130,90),85,5:PRINT(130,9
0),3,5:LINE(130,90),36,1
67 GO TO 72
68 DRAW$C3,C2,D10,1,180:DRAW$C15,C18
49,49,25:USL(2,1,1)LINE$C15,C18,136
20$B1180$C18,0:IF 10$B1180$C18,0
LEAF 10$B1180$

```

Continued on page 26

[illegible]







```

207,127),4,4:CIRCLE(40,130),15,2:P
AINT(43,127),2,2:CIRCLE(204,130),1
5,2:PRINT(207,127),3,2
71 CIRCLE(215,400),5:CIRCLE(205,300)
,5:CIRCLE(225,400),4,2:CIRCLE(100,5
0),15,4:PAINT(100,50),1,4
72 THE 38 BLOCKS
73 FOR X=50 TO 205 STEP100
74 FOR Y=0 TO 150STEP 50
75 LINE (X,Y)-(X+50),(Y+50),PSET,
5
76 LINE (X+50,Y+30)-(X+100,Y+60),PS
ET,5
77 NEXT Y:NEXT X
78 LINE(5,0)-(255,150),PSET,5
79 IF(1) THEN(1)
80 PAINT(210,160),2,5:PAINT(10,100
,0,0):PAINT(10,160),3,0:OUT(0,0)
81 PAINT(210,160),2,2
82 FOR Q=1 TO 4:PCOPY TO Q:NEXT Q
83 CLS:PRINT(532,"IF YOU WOULD LIKE
TO BE REMINDED OF THE DRAWING UNC
E IT HAS BEEN SCHEDULED PRESS THE
/ KEY")
84 REM GET ENCH BLOCK
85 GET(15,0)-(35,30),A1,5
86 GET(155,0)-(155,30),B1,5
87 GET(145,0)-(155,30),C1,5
88 GET(150,0)-(205,30),D1,5
89 GET(205,0)-(255,30),E1,5
90 GET(5,30)-(155,60),A2,5
91 GET(15,30)-(105,60),B2,5
92 GET(145,30)-(155,60),C2,5
93 GET(155,30)-(205,60),D2,5
94 GET(205,30)-(255,60),E2,5
95 GET(5,60)-(35,90),A3,5
96 GET(155,60)-(155,90),B3,5
97 GET(145,60)-(155,90),C3,5
98 GET(155,60)-(205,90),D3,5
99 GET(205,60)-(255,90),E3,5
100 GET(5,90)-(35,120),A4,5
101 GET(155,90)-(105,120),B4,5
102 GET(145,90)-(155,120),C4,5
103 GET(155,90)-(205,120),D4,5
104 GET(205,90)-(255,120),E4,5
105 GET(5,120)-(35,150),A5,5
106 GET(155,120)-(105,150),B5,5
107 GET(145,120)-(155,150),C5,5
108 GET(155,120)-(205,150),D5,5
109 GET(205,120)-(255,150),E5,5
110 BUREN(1,0)
111 GET(5,150)-(35,180),A6,5
112 GET(155,150)-(105,180),B6,5
113 GET(145,150)-(155,180),C6,5
114 GET(155,150)-(205,180),D6,5
115 GET(205,150)-(255,180),E6,5
116 REM MOVE THE BLOCKS
117 X1=5:Y1=0:X2=5:Y2=0
118 P=1:FORQ=1 TO 4
119 Q=END(2):GO TO(134)
120 NEXT Q
121 IF QAP="Y" THEN QAP=1
122 REM MOVE THE BLOCKS AGAIN
123 FOR P=1 TOQAP
124 Q=END(4)
125 GO TO(134)
126 NEXT P
127 Q=0
128 REM KEYBOARD COMMANDS
129 AA=1&EVE:IF AA="" THEN(129)
130 IF AA="/" THEN GO TO(105)
131 Q=Q+1
132 IF ASC(AA)=Q THEN Q=1 ELSE IF
ASC(AA)=94 THEN Q=2 ELSE IF ASC(AA)
=9 THEN Q=3 ELSE Q=4
133 SOUND(100,1)
134 ON Q GO TO 136,137,138,139
135 GO TO 129
136 IF X=1=0 AND P<5A=0 THEN(126) EL
SE IF X=1=0 AND P=5A=0 THEN(127) EL
SE X=X+1:GO TO(140)
137 IF Y=1=0 AND P<5A=0 THEN(126) EL
SE IF Y=1=0 AND P=5A=0 THEN(127) EL
SE Y=Y+1:GO TO(140)
138 IF X=1=0 AND P<5A=0 THEN(126)
ELSE IF X=1=0 AND P=5A=0 THEN 1
29 ELSE X=X+1:GO TO(140)
139 IF Y=1=0 AND P<5A=0 THEN(126) E
LSE IF Y=1=0 AND P=5A=0 THEN 129
ELSE Y=Y+1:GO TO(140)
140 K2=X+50-45:K3=Y+50-50:Y2=Y1
+30:Y3=Y1+50:Z= A(X1,Y1)+A(X2,Y1)+A(X
1,Y2)+A(X2,Y2)+Y1+Y2+Y3
141 IF P<Q THEN K2=K2+1:GO TO(120)
142 IF P=QAP THEN K2=K2+1:GO TO(126)
143 IF X=5 AND Y=6 GO TO 174 ELSE 1
29
144 PUT(K2+50-45,(Y1+30)-(X+50+5,
Y+30),56,PSET:A(X1,Y1)+A(X2,Y1)+A(X
1,Y2)+A(X2,Y2)+Y1+Y2+Y3
145 PUT(X2,Y2)-(X3,Y3),A1,PSET:GO T
O(144)
146 PUT(X2,Y2)-(X3,Y3),B1,PSET:GO T
O(144)
147 PUT(X2,Y2)-(X3,Y3),C1,PSET:GO T
O(144)
148 PUT(X2,Y2)-(X3,Y3),D4,PSET:GO T
O(144)
149 PUT(X2,Y2)-(X3,Y3),E1,PSET:GO T
O(144)
150 PUT(X2,Y2)-(X3,Y3),A2,PSET:GO T
O(144)
151 PUT(X2,Y2)-(X3,Y3),B2,PSET:GO T
O(144)
152 PUT(X2,Y2)-(X3,Y3),C2,PSET:GO T
O(144)
153 PUT(X2,Y2)-(X3,Y3),D2,PSET:GO T
O(144)
154 PUT(X2,Y2)-(X3,Y3),E2,PSET:GO T
O(144)

```

Continued on page 21



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Popular computing Weekly, Dec. 1984





```

0155 PUT(X2,Y2)-(X3,Y3),A3,PSET:B0T
0144
0156 PUT(X2,Y2)-(X3,Y3),B3,PSET:B0T
0144
0157 PUT(X2,Y2)-(X3,Y3),C3,PSET:B0T
0144
0158 PUT(X2,Y2)-(X3,Y3),D3,PSET:B0T
0144
0159 PUT(X2,Y2)-(X3,Y3),E3,PSET:B0T
0144
0160 PUT(X2,Y2)-(X3,Y3),F4,PSET:B0T
0144
0161 PUT(X2,Y2)-(X3,Y3),G4,PSET:B0T
0144
0162 PUT(X2,Y2)-(X3,Y3),H4,PSET:B0T
0144
0163 PUT(X2,Y2)-(X3,Y3),I4,PSET:B0T
0144
0164 PUT(X2,Y2)-(X3,Y3),J4,PSET:B0T
0144
0165 PUT(X2,Y2)-(X3,Y3),K5,PSET:B0T
0144
0166 PUT(X2,Y2)-(X3,Y3),L5,PSET:B0T
0144
0167 PUT(X2,Y2)-(X3,Y3),M5,PSET:B0T
0144
0168 PUT(X2,Y2)-(X3,Y3),N5,PSET:B0T
0144
0169 PUT(X2,Y2)-(X3,Y3),O5,PSET:B0T
0144
0170 PUT(X2,Y2)-(X3,Y3),P5,PSET:B0T
0144
0171 PUT(X2,Y2)-(X3,Y3),Q5,PSET:B0T
0144
0172 PUT(X2,Y2)-(X3,Y3),R5,PSET:B0T
0144
0173 PUT(X2,Y2)-(X3,Y3),S5,PSET:B0T
0144
0174 PUT(X2,Y2)-(X3,Y3),T5,PSET:B0T
0144
0175 REM OVER IF DONE
0176 FOR Q=1 TO 10 STEP 1
0177 IF A(R,S)=SF OR S=1 THEN NEXT R
0178 GOTO 174
0179 IF A(R,S) < SF THEN GOTO 176 ELSE GOTO 177
0180 FOR Q=1 TO 10
0181 SEARCH FOR CORRD L&Z LOCATED
0182 IF FOUND THEN GOTO 184
0183 CL$PRINT#15,"NO CORRD LOC'D YET!"
0184 GOTO 177
0185 PRINT#15,"CORRD FOUND!"
0186 IF FOUND THEN GOTO 184
0187 IF Q=10 THEN GOTO 177
0188 GOTO 176
0189 PRINT#15,"NO CORRD FOUND!"
0190 IF Q=10 THEN GOTO 177
0191 PRINT#15,"CORRD FOUND!"
0192 GOTO 176

```

[illegible]

various sized, however, it looks as if the article shape is rotating. You are given the object's *id* attribute, a *color* or a *category*.

used, simply delete these two lines though the program will not be as efficient.

```

10 *****
20 == SORBITOR ==
30 == H. SALICORNIA ==
40 *****
50 TITLE
60 CLSO
70 L=INT( (58+1)*10
80 PP=INT(44+CHRG(140+L)+CHRG(140+L
+CHRG(134+L)+CHRG(120)+CHRG(142+L
+CHRG(140+L)+CHRG(137+L)
90 C=INT(13+L
100 PR=INT(87+CHRG(140+L)+CHRG(142+L
+CHRG(144+L)+CHRG(128)+CHRG(138+L
+CHRG(120)+CHRG(133+L)
110 PR=INT(72+3+CHRG(131+L)+CHRG(13
+L)+CHRG(138+L)+CHRG(120)+CHRG(1
39+L)+CHRG(131+L)+CHRG(134+L)
120 PR=INT(72,"rotator"
130 PR=INT(72+&4,"any"+CHRG(139)+"
row"
140 IF 156+CHRG(139) THEN GO

```



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This is a very professional program and can certainly be recommended. — *Chickadee*, 1994, June 1994

<sup>10</sup> "Big Coal and Big Oil: A 100th Birthday Party" = *ABC*, June 1998.

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# Bookbytes

Sent online for review to: *Atsushi Ogasawara*, *David Gifford*, *John Harrison*, *David Jones*, *London*, *UK*

**Book:** *Teaching Your Dragon*  
**Authors:** Pauline Collins and John Sharp

**Publisher:** Prentice-Hall International

**Price:** £7.95

IT IS unfortunately true that most computer manuals leave a lot to be desired. This is not always the writer's fault; as before often has to set a prototype machine that is nothing like the finished article. Manufacturers are notorious for their changes, both up to and beyond the launch of the new computer. This provides other authors with the opportunity to delve into different aspects of the machine that the manual has failed to cover.

The Dragon has been taken, written most in realising its configuration, but the manual itself came in for a certain amount of criticism at the launch as not providing enough clear explanation for the novice user. *Teaching Your Dragon* aims to help the beginner get to grips with his machine, although more as a practical guide than as the detailed explanation of some of the features.



In 25 chapters, the book ranges from beginner's basic through graphics and sound up to a brief experiment at machine code. There are many short programs scattered through the text to explain particular points, and the occasional diagram to illustrate the text. The style is friendly if rather verbose but has a tendency to become rather weary in places.

The chapter on editing is well presented and will encourage any reader to spend

more time on learning to use what is one of the Dragon's finer points. Many users never become familiar with some of the editing commands which are well worth the trouble of learning.

Another part of the book I particularly liked was the large amount dealing with graphics techniques. There are eight chapters on this subject and in some ways there is too much detail here. The novice is likely to find it rather overwhelming as you have to read pages and pages of text before you actually discover how to do anything. For someone who has spent some months puzzling over the manual, however, it is pitched just about right. You will find new ideas that are not available elsewhere, but you do lose the advantage of having them all together in one volume.

I am surprised to see this book appears so long after the launch of the Dragon, and in some ways the publishers have probably left a long time for the book to sell well, which is a pity as it is obviously the result of some hard and essential work. If you are new to the Dragon and need a copy of *Doing Ahead With Colour* (also from your local Tandy shop) call my favourite independent Dragon/Colour Computer Book then you could do worse than buy *Teaching Your Dragon*.

John Searson

**Book:** *Exploring Adventure on the Dragon*

**Author:** Peter Gernard

**Publisher:** Duckworth

**Price:** £5.95

PETER GERARD, author of several books on the Commodore computer, has now turned his attention to the Dragon with this book for would-be adventure game programmers. The book begins at Commodore origins in places, with references to the desirability of using lower-case text and selection of screen and border colours both unavailable on the Dragon, but the program listings have fortunately been edited more thoroughly than the text and should run successfully on the Dragon if you have the energy to type them in. (If you don't

you will be relieved to know that a cassette version is available.)



Three complete adventure games, all written in Basic to the same format are provided and there is a line-by-line explanation of one of the listings. The idea is that a careful study of the listing should enable you to write your own games along similar lines. The author has thoughtfully provided some skeleton plots as well, so these readers whose programming skill exceeds their imagination.

The book also contains a section on the theory and development of adventure games, with detailed descriptions of the *Wizard Adventure* and some of the Scott Adams adventures (not as far as I know available on the Dragon) and a rather unnecessary section on elementary programming.

It is by no means the worst computer book I've seen, but you'd do better to spend your money on a subscription to an adventure magazine.

Margaret Rennie

**Book:** *6809 Machine Code Programming*

**Author:** David Barnow

**Publisher:** Granada

**Price:** £7.95

THERE IS no shortage of books about machine code on the Dragon — some are good, some are bad. *6809 Machine Code Programming* by David Barnow is, despite its title, one of the better ones.

The book starts off assum-

ing no previous knowledge of machine code and tries to eliminate some of the myths which surround the language. Chapter 1 is rather badly entitled "How to Write machine code programs" in a David introduces the principles of structured programming including flow charts, documentation and debugging.

*6809 Machine Code Programming* is designed principally to be a collection of program subroutines which are both useful and are meant to introduce the concepts of programming in the computer native language. Subsequent chapters deal with number handling, the Dragon's support chips, high resolution graphics and sound. Particularly interesting is chapter seven which includes a program to display full upper and lowercase characters on the four screens.



All of the routines are meticulously documented and much useful information can be found within them for the beginner. Although some code would have been nice to have a decent memory map and perhaps a list of useful ROM routines.

There are a number of useful appendices covering 6809 architecture and assembly. If you're looking for a book on 6809 machine code with references to the Dragon then this is worth considering. When it lacks in technical information it makes up for it in general approach.

David Dodge







## Perfect harmony

I HAVE noticed an some of my guitar tapes that the accompaniment music is played in harmony (that is, there that one note at a time)

I have never seen any information as to how this is achieved and would be most grateful if you could enlighten me

P W Robinson  
Bromington  
Staffordshire

THIS type of music is only available by using modulus code routines which are not particularly easy to write. A program called The Computer is available from Microanal which allows you to enter music in four voices in simple code from the program will then create a matching code routine which you can save and use in your own BASIC programs.

Computer code D10 and is available from Microanal at 29 Thorne Road, St Austell, Cornwall PL25 5JZ

## Connect a cassette

IS it possible to connect an ordinary cassette microphone (with cassette jack plug) to the speech port of the Dragon 32? If so, which pins should I connect the two halves of the jack plug to? I hope to use the microphone input in a speech recognition program by reading the voice of the joystick port from Machine Code.

Dennis Gaskin  
Cirencester  
West Midlands

THE short answer is NO. The joystick ports are 5V devices which output voltage — the code storage your microphones and any other device you plug in. Joysticks, lightpens and so on give a resistance value which can be detected by the ROM module which compares the voltage sent out to that opening back.

You would be better to connect your microphone into an amplifier (such as a cassette recorder) to the tape output on the Dragon.



## Making more memory

I HAVE just recently purchased a Dragon Data disk drive and found out that because the disk cartridge takes up the first page of graphics memory I could not get some of my programs to enter load or run.

This is very annoying as every time I want to load my favourite game I have to take out the disk cartridge. Are there any machine code routines or pages that I can enter before loading?

Jandy Moore  
Leicester

IF it possible to "swap" the disk cartridge by using software on the computer thinks it isn't there. The program to do this is too long to list here, but is fairly simple to write given the following information.

You need to copy the basic load program from ROM to RAM. This starts at address 44010. You then need to change this so that it doesn't check for the disk cartridge (I found this by looking in my monitor the first few bytes of 44010-4 are 04). Finally you need to manually set the top of memory pointers and reset your modified startup program in RAM.

To return to the disc, simply type PAGE 100 and press return.

## Graph equation

I HAVE owned my Dragon 32 for about months now and have been buying your magazine (Dragon 32or) for it. I have seen on an

advertisement for a printer a graph driver.

I would like to be able to enter an equation and have it plotted on a graph. Please can you advise me a program that will do this.

Ralph Stewart

THE hardware SM, COS and TAN are useful for drawing the type of graphs you describe. The particular graph shown in the advert you refer to is a simple sine graph, which can be drawn with the following start program.

```
10 PMODE 0: COLOR 0,1
20 GOTO 10
30 FOR X = 0 TO 360
40 Y = SIN(X/57.3)*50:Y0=Y0+Y0
50 PLOT(X,Y):NEXT X
60 GOTO 30
```

## Print m/c numbers

I HAVE two questions I would like to ask you

- (1) How do you achieve CLSAD and CLSADR a machine code?
- (2) How do you print numbers in machine code as JS 14954A only prints a letter?

David Hooley  
Aberkane

TO achieve CLSADR use up the 65020 in loc. 474-480, then LDR machine code to print

```
0000 0
LDR -start of date
510 487
LDR -end of date
0000 0
LDR -ready date
0000 0
STX 485
JMP 5100
```

To access CLSADR use JS 41000

To print a full number in the 10 registers to the screen use CLR 011

JS 00100  
and to the printer use  
LDR 0104  
STX 101  
JS 00100

## Tandy interface

I HAVE had a Dragon 32 for about one and a half years and am thinking of buying a Tandy TP 10 printer. But have feared that it is incompatible.

Can I modify this printer to work with the Dragon, and if so can you show me the connections between a five-pin din plug and a parallel plug. I would like to make my own lead so ready made leads are expensive.

Andy Abbott  
West Midlands

THE Tandy TP 10 is not compatible with the Dragon as it has only a serial interface and the Dragon requires a parallel interface. It is certainly not possible to convert for two directly and as far as I know there is no interface available to do this. The printer is designed only to be used with the Tandy Code

## VARPTR and USR

PAGE 50 of the Page to call machine code routines from a Basic program using VARPTR.

Also could you explain VARPTR how it is used and what it is used for.

Ronald Craig  
Bathurst

THE USR command can be used with your machine code routines to pass values to and from Basic. It pass routine starts at address 30000. Then the USR address is set up as follows: USR 0000 = 30000

To call your routine and pass a variable to it use  
X = USR0 (VARPTR(X)) (Dragon 32)  
X = USR0 (VARPTR(X)) (Dragon 40)

VARPTR returns a 16 bit address of the variable pointer, this can be returned in the B register if your program uses JS 00020. Thus (B) will be the length of the string (B-1) will be the address of the start of the string.







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AFTER LAST month's goodies, with *The Hawk* and the first in the *Mysterious Adventures* series, it's rather a good time, when should at least be good times for every one's pocket. If you do have money to spend, though, then Channel 5 continues to churn out Dragon conversions of the *Mysterious Adventures* of which there will be 11 in total, and at £9.95 a time it makes you glad to be a reviewer.

I had been hoping to run through the *Mysterious Adventures* in order, but they are coming rather haphazardly, the most recent to turn up being their latest title, *Waxworks* (number 11). Before that, however, I had an opportunity to look at number five in the series, *Feasibility Experiment* — and it's Brian Howarth's job this time, but written jointly with Michael Martin. The format is the same for all the series I've seen so far: a text-only 3D version and a graphics 64 version on the same tape, a computerized defined character set, with the top quarter of the screen being one of the descriptions, visible objects and stats, and your commands, and the responses scrolling up in the bottom three-quarters of the screen.

### Feasibility

From the blurb it would seem the *Feasibility Experiment* is a so-so type of story. Far beyond the subatomic galaxy of our universe, beyond the wildest imaginings of martial man, lies a rarely seen World. It has been built by beings who have no physical form but are thereby clouds of pure mental energy. So where does *Feasibility Experiment* come from? Does *Feasibility Experiment* come from *Blade Runner* or *Star Trek*?

It seems things have gone wrong on this world and they need a Superhero from Earth as a sustaining life force, and you have been whisked away to make up an old mission, not realizing you are undergoing the experiment of the title to see if you are a worthy Superhero. Come on, Fred, you can do it! You have 700 turns with a soft voice regularly whispering how many you have left.

Going first takes you into a "Meeting Room" through the window of which you can see a pile of lava. Funny, I thought, a little further on I wandered down a tunnel and came out in an arena where a rat proceeded to rip me apart. Not so funny, I thought. The second I had found could seem to have much effect on the nervous Ian

but after a wonder round a maze of tunnels I found a means of defence enabling me to go safely through the maze, when I found myself in the Gorgona's Box — I made a little enquiry and was reassured by its guards. Charming.

Travelling the other way leads to empty plains and mountain peaks with several objects including the old treasure, which is what you are looking for. Collecting the treasure proves your heroic qualities. The standard of this series is fairly consistent as regards toughness, and also as regards the fairly terse descriptions. It's in a weapons room, and I'm in a tunnel, and so on. Feasibility Experiment didn't appeal to me so much as some of the others because of its rather disjointed nature, although this is just of the overall idea, if you like the series, however, then it should be grippier.



Pretending for me was the next title, *Waxworks*. Here you wake up in the lecture lounge of a deserted waxworks. Must, if you want to stay out of trouble, don't fall asleep. You always wake up somewhere strange. This place is even stranger as you're not told what you're meant to be doing. The cassette comes with a short film giving you the outline for the first 10 adventures in the game, but not the answers. No wonder they call them *Waxworks*.

All that this first screen tells you is "I remember coming to the Waxworks."

must have slept. The place in detail is a Spooky World now? Well, indeed? Well you can start by examining the wooden beam, the public telephone, the old fashioned slot machine, and the reading around the lecture room, before wandering off to check out the exhibits of the Grand Hall. This must be the first adventure where you can utilize the command **EXAMINE** JACQUES COUSTEAU.

### Scuba Gear

In front of the exhibit you're asked a riddle, and though I've given the right answer a demon's spirit to finish does me much good. I couldn't persuade old Jacques to hand over his scuba gear, which would surely come in handy in the large aquarium tank where you come to grief in the teeth of Jean M. There's another exhibit covering the account of Oliver and other features include a series of old saws, full of rats, a bottle of red ink, but no visible means of escape, and a maze in the Hall of Mirrors which needs to be thoroughly tested and investigated as it leads to more than one place. *Waxworks* might be a bit more expensive than a visit to Madame Tussaud's, but I can guarantee it's far longer.

Finally this month's query from a reader who recently bought the graphics version of *Castle Island From Dragon Data*. Alan Warner of London SW2 says that he loves the graphics, but unfortunately can't get out of the first few locations, the mud in a cave that the adventure opens up when you make your way to Professor Leganto's secret laboratory, but the laboratory's proving a little too secretive for Alan. This is one of those occasions where looking once at an object is not enough, you have to look twice. And if you were a clue as to which object, all it says is that Mrs. Thrushers is a girl one.

If other readers have any queries then I'll try to help if I can, and in the spirit of mutual co-operation that seems to exist amongst editors, if anyone can help two perplexed *Madness* and the *Ming-tao* I'd be glad if they could spare a minute or two to write to me. ■

Each month Mike Gerrard will be posting an adventure for the Dragon if you have an adventure you would recommend to us. Send advice or have some to offer with to Mike Gerrard, Adventure Trail at Dragon User.



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## Counting counters

*Melbourne House provides the prizes to  
Gordon Lee's famous puzzle*

THERE MUST be many of us, I'm sure, that have sat up late into the night with a tricky problem on our Dragons, and who have found that on finally going to bed sleep is denied us as the problem persists, its going round and round in our heads. If you have been so affected you may be surprised to hear that a similar problem was not unknown to one of the most well known figures in English literature just a century ago. That person was Lewis Carroll, and I feel free to add that it was not



### Prize

With counting, MELBOURNE is offering to reward a DRAGON to win a copy of its sequel to Hungry Horser: Horser (Open Sking delivered in the September issue of Dragon User)

### Rules

THERE WERE TWO winners chosen from amongst the many entries to the August Competition. The first prize winner is Alistair Bennett from Essex who also is the recipient of a DODGE Mini disk drive system from Quans, (delivered prior to the single disk equivalent). The second has been won by Tom Jones of Spotswood in Derby.

Both winners correctly stated that the key code used was 485 to obtain the message: "CHECK THIS ON YOUR COMPUTER AND YOU MAY WIN TWO MONTHS' DRAGON USER COMPETITION".

### August winners

TO WIN a copy of the game you must show both the answer to the competition and how to solve it with the use of a BASIC program displayed on your Dragon. (Please do not send in a cassette containing the answer). As a consolation we give the following sentence in 10 words or less: "I want to own a copy of Horner Horser Sking delivered".

Your entry must arrive at Dragon User by the first working day of November. The winners and the editor of the puzzle will be published in our February issue. Entries will not be acknowledged and we cannot enter into correspondence on the result. You may only draw the competition once.

computer problems that were the bane of his existence, but mathematical topics of a more general nature.

Leslie Carroll, the pen name under which the Reverend Charles Lutwidge Dodgson published his immortal children's classics, was also the author of non-academic works on formal logic and Euclidean geometry. However, it is probably for his creation of such characters as the Cheshire Cat, Queen of Hearts, White Rabbit and the Walrus and Carpenter that he will be best remembered.

### Photography

Educated at Rugby and Oxford, he entered Christ Church, Oxford in 1861 and was appointed lecturer in mathematics there in 1864. His other interests were in photography, then in its infancy, and in which he achieved a fair amount of notability and in the church — he was ordained a deacon in the Church of England in 1861.

In between the fantasy world of Alice in Wonderland — (just imagine what sort of computer adventures he could have written!) — and his mathematical works, he created a number of interesting collections of puzzles and diversions. These he started up at his parlour to the first edition of his *Pillow Problems*, were thought up while lying awake at night. Indeed, according to many of the puzzles in this collection are the actual dates on which

they were devised. For instance, on 5 September 1867 he presented the following curious problem:

A bag contains two counters, as to which nothing is known, except I feel sure is either black or white. Ascertain their colours without taking them out of the bag."

He then proceeds by a convoluted process of logic, to show that the bag must contain one black and one white counter. Perhaps this strange logic is to be ascribed from the creator of Alice's Adventures in Wonderland.

"Take some more tea," the March Hare said to Alice seriously.

"I've had nothing yet," Alice replied in an offended tone. — "So I can't take more."

"You mean you can't take less," said the Hatter. "It's a very easy way to take more than nothing."

For this month's competition we are reproducing one of Lewis Carroll's puzzles — dated 4 March, 1880. There are three bags, each containing six counters, one contains five white and one black, another four white and two black, the third three white and three black. From two of the bags (it is not known which) a counter is drawn (one from each) and which proves to be the black and one white. What is the chance of drawing a white counter from the remaining bag?

Assume that Lewis Carroll had a computer and show how he might have used it to solve this problem.



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